C.3
2/1/01

NPL-U36-2-6-R5 147326

**HRS DOCUMENTATION RECORD--REVIEW COVER SHEET**

Name of Site: Matthiessen and Hegeler Zinc Company

Contact Persons

| | | |
|---|---|---|
| Site Investigation: | Mr. Robert Casper, Illinois EPA | 217-782-6761 |
| Documentation Record: | Mr. Robert Casper, Illinois EPA<br>& Mr. Peter Sorensen, Illinois EPA | 217-782-6761 |

Pathways, Components, or Threats Not Scored

The groundwater migration pathway was not scored.

The air migration pathway was not scored.

The soil exposure pathway was not scored. The soil exposure pathway has also been impacted by activities at the site but has not been used to score the site. During the 1993 CERCLA Integrated Assessment sampling event, several soil samples were collected from nearby residences' yards. Many of these were found to contain elevated levels of metals which are associated with the site. The pathway was not scored, however, because there was insufficient information to produce an accurate score.

**HRS DOCUMENTATION RECORD**

Name of Site: Matthiessen and Hegeler Zinc Company

EPA Region: V Date Prepared: 2-1-01

Street Address of Site: 1375 9th Street, LaSalle, Illinois

County and State: LaSalle County, Illinois

General Location in the State: North-central Illinois

Topographic Map: La Salle, Illinois (USGS 7.5 Minute Quadrangle)

Latitude: 41° 20.529' Longitude: 89° 04.984' (measured at Sample Point X103 which can be seen on Figure 2-4)

Scores

| | |
|---|---|
| Air Pathway | NS |
| Ground Water Pathway | NS |
| Soil Exposure Pathway | NS |
| Surface Water Pathway | 100 |
| **HRS SITE SCORE** | 50.00 |

**Surface Water Overland/Flood Migration Component Score Sheet**

| Factor Category and Factors | Maximum Value | Value Assigned |
|---|---|---|
| **Human Food Chain Threat** | | |
| **Likelihood of Release:** | | |
| 1.) Observed Release | 550 | 550 |
| 2.) Potential to Release: | | |
| 2a. Containment | 10 | |
| 2b. Runoff | 25 | |
| 2c. Distance to Surface Water | 25 | |
| 2d. Potential to Release by Overland Flow (lines 2a[2b+2c]) | 500 | |
| 3.) Potential to Release by Flood: | | |
| 3a. Containment (Flood) | 10 | |
| 3b. Flood Frequency | 50 | |
| 3c. Potential to Release by Flood (lines 3a x 3b) | 500 | |
| 4.) Potential to Release (lines 2d + 3c, subject to maximum of 500) | 500 | |
| 5.) Likelihood of Release (higher of line 1 and 4) | 550 | |
| **Waste Characteristics:** | | |
| 15.) Toxicity/Persistence/Bioaccumulation | (a) | 50000000 |
| 16.) Hazardous Waste Quantity | (a) | 10000 |
| 17.) Waste Characteristics | 1,000 | 560 |
| **Targets:** | | |
| 18.) Food Chain Individual | 50 | 45 |
| 19.) Population | | |
| 19a. Level I Concentrations | (b) | |
| 19b. Level II Concentrations | (b) | 0.03 |
| 19c. Potential Contamination | (b) | |
| 19d. Population | (b) | 0.03 |
| 20.) Targets (lines 18 + 19d) | (b) | 45.03 |
| **Human Food Chain Threat Score:** | | |
| 21.) Human Food Chain Threat Score | 100 | 100 |

**WORKSHEET FOR COMPUTING HRS SITE SCORE**

| | | S | $S^2$ |
|---|---|---|---|
| 1. | Ground Water Migration Pathway Score ($S_{gw}$) (from Table 3-1, line 13) | NS | NS |
| 2a. | Surface Water Overland/Flood Migration Component (from Table 4-1, line 30) | 100 | 10,000 |
| 2b. | Ground Water to Surface Water Migration Component (from Table 4-25, line 28) | NS | NS |
| 2c. | Surface Water Migration Pathway Score ($S_{sw}$) Enter the larger of lines 2a and 2b as the pathway score. | 100 | 10,000 |
| 3. | Soil Exposure Pathway Score ($S_s$) (from Table 5-1, line 22) | NS | NS |
| 4. | Air Migration Pathway Score ($S_a$) (from Table 6-1, line 12) | NS | NS |
| 5. | Total of $S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2$ | | 10,000 |
| 6. | **HRS Site Score** Divide the value on line 5 by 4 and take the square root | 50.00 | |

## REFERENCES

Reference
Number Description of the Reference


1. U.S. Environmental Protection Agency Hazard Ranking System, 40 CFR Part 300, Appendix A. December 14, 1990, excerpt 1 page.

2. Environmental Protection Agency. Superfund Chemical Data Matrix (SCDM). Publication 9345.1-22, EPA/540/R-961029, PB96-963510. June 1996. Not Included - Publicly Available Document.

3. Illinois Environmental Protection Agency. CERCLA Integrated Assessment Report - Matthiessen and Hegeler, ILO 000064782. 1994. 105 pages.

4. Environmental Protection Agency. CERCLA Site Inspection Report - Carus Chemical Company, ILD 005477666. 1992. 81 pages.

5. Casper, Robert. Illinois Environmental Protection Agency. Field Log Book. November 12, 1993, December 14, 1993 - December 15, 1993. 10 pages.

6. Casper, Robert. Illinois Environmental Protection Agency. Field Log Book. October 30, 1991, November 20, 1991 - November 21, 1991. 14 pages.

7. Illinois Environmental Protection Agency. CERCLA Integrated Assessment Workplan - Matthiessen and Hegeler, ILO 000064782. December, 1993. 9 pages.

8. Environmental Protection Agency. CERCLA Site Inspection Workplan - Carus Chemical Company, ILD 005477666. November, 1991. 10 pages.

9. Illinois Department of Transportation. Aerial Photograph of former Matthiessen and Hegeler property. April 16, 1988.

10. Casper, Robert. Illinois Environmental Protection Agency. Matthiessen and Hegeler. Memo. Waste Pile Area Calculation. October 17, 2000. 1 page.

11. Casper, Robert. Illinois Environmental Protection Agency. Matthiessen and Hegeler. Memo. Shallow Waste Pile Area Calculation. October 17, 2000. 1 page.

12. Illinois Environmental Protection Agency. CERCLA Integrated Assessment Sampling Results - Matthiessen and Hegeler, ILO 000064782. February 22, 1994. 196 pages.

13. Illinois Environmental Protection Agency. CERCLA Site Inspection Sampling Results - Carus Chemical, ILD 005477666. December 18, 1991. 17 pages.

14. Illinois Department of Natural Resources. Illinois Fishing Guide. Not dated. 64 pages.

15. Sorensen, Peter. Illinois Environmental Protection Agency. Matthiessen and Hegeler. Memo. Documentation of use of Little Vermilion River as a fishery. November 1, 2000. 2 pages.

16. Weisse, Leah and Sharer, Amy. "Matthiessen & Hegeler Zinc Company Records". August 1985. 5 pages.

17. U.S. Geological Survey. LaSalle, Illinois Quadrangle, 7.5 Minute Series, Topographic Map. 1993. 1 page.

18. Illinois Environmental Protection Agency. NPDES Permit No. Il0038296 Modification. December 22, 1995. 7 pages.

**2.0 Site Summary**

The Matthiessen and Hegeler Zinc Company is an inactive primary zinc smelter and rolling facility located on the east side of the city of La Salle, La Salle County, Illinois. The facility began operations in 1858 and operated until 1978 (Ref. #16, p. 4 - 5). The facility stopped smelting zinc in 1968 and from 1968 until closing in 1978 only conducted rolling operations. The property formerly occupied by Matthiessen and Hegeler Zinc Company is approximately 160 acres in size with the Little Vermilion River bordering its east boundary. Figures 2-1 and 2-2 show the location of the former Matthiessen and Hegeler Zinc Company property.

The Matthiessen and Hegeler Zinc Company site includes the two sources which have been identified and the contamination that has migrated from these sources. One of these sources consists of a slag waste pile which is located on the southeast portion of the former facility property adjacent to the Little Vermilion River. Figure 2-3 shows the location of the waste pile. This source was found to contain elevated levels of cadmium, copper, chromium, lead, nickel and zinc. The second source used to define the Matthiessen and Hegeler Zinc Company site is a shallow waste pile which is located on the former smelter property (Ref #3, p.4-1 and p. 4-2). Figure 2-4 shows the location of this shallow waste pile. This source was found to contain elevated levels of lead, cadmium, zinc and copper. The metals that were detected in the two sources have been found to have migrated into the Little Vermilion River, which lies just east of Source #1.

The run-off from both waste piles flows directly into the Little Vermillion River. The State of Illinois identifies the Little Vermillion River as a fishery populated with small mouth bass, bluegill, sunfish, crappie, channel catfish, bullheads, carp and drum fish.

During the 1993 CERCLA Integrated Assessment sampling event, several soil samples collected from nearby residents' yards were found to contain elevated levels of metals associated with the Matthiessen and Hegeler Zinc Company site. This possible contamination threatens approximately 9,881 people living within a one mile radius of the site. In addition, the fence surrounding the site contains holes and trespassers were observed on the property during site visits. The pathway was not scored, however, because there was insufficient information to produce an accurate score.

## 2.2 Source Characterization

Number of the source: 1

Name and description of the source: Wastepile: Residue Pile
(aka slag pile or cinder pile)

The first source scored at the Matthiessen and Hegeler Zinc Company site is an approximately six-acre (Ref #10) wastepile located in the southeast portion of the former smelting facility property (see Figure 2-3).

The wastepile is composed of waste material generated from the primary zinc smelting process. It is unknown exactly when the pile began to accumulate but wastes have not been added to the pile since the primary smelter ceased operations circa 1968.

Samples of the wastepile material collected during the CERCLA Integrated Assessment (Ref #5, p. 3 and 4) document the presence of the following hazardous substances: cadmium, copper, chromium, lead, nickel and zinc (Ref #12, p. 106 - 108).

Location of the source, with reference to a map of the site:

As shown in Figure 2-3, Source #1 is located in the southeast portion of the former smelter property, located along the west bank of the Little Vermilion River.

Containment

Gas release to air:
Not scored

Particulate release to air:
Not scored

Release to ground water
Not scored

Release via overland migration

Source #1 does not have a complete, maintained, engineered cover or a functioning and maintained run-on control system and runoff management system (Ref #3, p. 4-3). Runoff from the wastepile flows into the Little Vermilion River, which lies immediately to the east of the wastepile (Ref #3, p. 5-4 and Ref. #7, p. 1). A surface water containment factor of 10 from Table 4-2 (Ref #1, Sec. 4.1.2.1.2.1.1) has been assigned to this source.

Release via flood

Source #1 is not designed, constructed, operated or maintained to prevent a washout of hazardous substances by a flood (Ref #3, p. 4-3). A containment (flood) factor value of 10 from Table 4-8 (Ref #1, Sec. 4.1.2.1.2.2.1) has been assigned to this source.

2.4.1 Hazardous Substances

In December, 1993 the Illinois Environmental Protection Agency collected three samples (X104, X105 and X106) from the wastepile during their CERCLA Integrated Assessment sampling event (Ref #5, p. 3 - 4). The materials sampled consisted of slag material which was a byproduct of the smelting operations that took place at Matthiessen and Hegeler. The material sampled did not contain any soil and was described as a "course, black, coal-like" material (Ref #5. P. 4). The hazardous substances which were detected in these three samples included: cadmium, chromium, copper, lead, nickel and zinc (Ref #12, p. 106 - 108).

| Sample Number | Date of Sample | Hazardous Substance | Conc. (mg/kg) | Sample Detection Limits* (mg/kg) | References |
|---|---|---|---|---|---|
| X104 | 12/14/93 | Cadmium | 36.1 | .7 | Ref #12, |
| | | Copper | 806 | 3.3 | P. 106 |
| | | Chromium | 43.3 | 1.3 | |
| | | Lead | 905 | 6.6 | |
| | | Zinc | 10200 | 2.7 | |
| X105 | 12/14/93 | Cadmium | 59.8 | .6 | Ref #12, |
| | | Copper | 428 | 3.1 | P. 107 |
| | | Chromium | 31.9 | 1.2 | |
| | | Lead | 342 | 6.1 | |
| | | Nickel | 105 | 4.9 | |
| | | Zinc | 42000 | 2.5 | |
| X106 | 12/14/93 | Cadmium | 181 | 6.2 | Ref #12, |
| | | Copper | 4340 | 3.1 | P. 108 |
| | | Chromium | 38.1 | 1.2 | |
| | | Lead | 1370 | .6 | |
| | | Nickel | 118 | 5.0 | |
| | | Zinc | 37500 | 2.5 | |

* Since these samples were analyzed using Contract Lab Program equivalent methods, the detection limits were adjusted according to sample size, percent moisture and dilution factors. This is true for all of the sample results presented in this documentation record.

2.4.2. Hazardous Waste Quantity

Insufficient information exists to evaluate Hazardous Constituent Quantity, Hazardous Wastestream Quantity and Volume. Therefore, the Hazardous Waste Quantity value for Source #1 is based on the area of the wastepile.

2.4.2.1.1. Hazardous Constituent Quantity
Not scored

2.4.2.1.2. Hazardous Wastestream Quantity
Not scored

2.4.2.1.3. Volume
Not scored

2.4.2.1.4 Area

The area of the base of the wastepile (i.e., land surface area under the pile, not the surface area of the pile) was measured using a planimeter and a 1988 aerial photograph of the site (Ref #9). See Figure 2-3 for the location of the waste pile. The planimeter readings were converted from square inches to square feet. Based on this information, the wastepile has been determined to occupy an area of approximately 259,780 square feet (5.96 acres) (Ref #10).

Area (A) = 259,780 $Ft^2$

To obtain a Hazardous Waste Quantity value for a pile, Table 2-5 of the Hazard Ranking System Final Rule instructs that the area value of the land surface under the pile in square feet is to be divided by a factor of 13 (Ref #1, Sec. 2.4.2.1.1). Therefore, the Hazardous Waste Quantity value for Source #1 was obtained as follows:

HWQ = 259,780 $Ft^2$ / 13 = 19,983

Area of source ($ft^2$): 259,780

Reference(s): Ref #10

Area Assigned Value: 19,983

2.4.2.1.5. Source Hazardous Waste Quantity Value

As previously indicated, the Hazardous Waste Quantity value for Source #1 is based on the area of the wastepile.

Source Hazardous Waste Quantity Value: 19,983

Number of the source: 2

Name and description of the source: Shallow Wastepile: Residue Pile
(aka slag pile or cinder pile)

The second source scored at the Matthiessen and Hegeler Zinc Company site is a shallow wastepile which is located on the former smelter property (Ref #3, p.4-1 and p. 4-2). The contaminants discovered in the samples which define Source #2 are a result of site activities which moved the slag around to these locations.

The current limits of Source #2 were defined by five samples collected from portions of the former smelter property during the December, 1993 CERCLA Integrated Site Assessment sampling event. The material sampled consisted of black, cindery slag material which was a byproduct of the smelting operations that took place at Matthiessen and Hegeler. The hazardous substances which were detected in these five samples included: cadmium, copper, lead and zinc (Ref #12, p. 104 - 105 and 109 - 111).

Location of the source, with reference to a map of the site:

As shown in Figure 2-4, the area of the shallow wastepile is located on the former smelter property. The lateral extent of Source #2 is defined by CERCLA Integrated Assessment samples X102, X103, X107, X108 and X109. Source #2 consists of that polygonal area bounded by the CERCLA Integrated Assessment samples (listed in a clockwise direction) X102, X107, X108, X109 and X103.

Containment

Gas release to air:
Not scored

Particulate release to air:
Not scored

Release to ground water:
Not scored

Release via overland migration and/or flood:

Source #2 does not have a complete, maintained, engineered cover or a functioning and maintained run-on control system and runoff management system (Ref #3, p. 4-2). Runoff from Source #2 flows into the Little Vermilion River (Ref #3, p. 5-4). A surface water containment factor of 10 from Table 4-2 (Ref #1, Sec. 4.1.2.1.2.1.1) has been assigned to this source.

2.4.1 Hazardous Substances

In December, 1993 the Illinois Environmental Protection Agency collected five samples (X102, X103, X107, X108 and X109) from the former smelter property during their CERCLA Integrated Assessment sampling event (Ref #3, p. 4-1 and 4-2). The material sampled consisted of black, cindery slag material which was a byproduct of the smelting operations that took place at Matthiessen and Hegeler. The hazardous substances which were detected in these six samples included: cadmium, copper, lead and zinc (Ref #12, p. 103 - 105 and 109 - 111).

| Sample Number | Date of Sample | Hazardous Substance | Conc. (mg/kg) | Sample Detection Limits(mg/kg) | References |
|---|---|---|---|---|---|
| X102 | 12/14/93 | | | | |
| | | Lead | 1310 | .6 | Ref #12, p. 104 |
| | | Cadmium | 67.7 | .6 | |
| | | Zinc | 16600 | 2.5 | |
| | | Copper | 407 | 3.1 | |
| X103 | 12/14/93 | | | | |
| | | Lead | 474 | .6 | Ref #12, p. 105 |
| | | Cadmium | 11.4 | .6 | |
| | | Zinc | 1650 | 2.4 | |
| | | Copper | 60.6 | 3.0 | |
| X107 | 12/15/93 | | | | |
| | | Lead | 646 | .7 | Ref #12, p.109 |
| | | Zinc | 445 | 2.8 | |
| | | Copper | 38.4 | 3.5 | |
| X108 | 12/15/93 | | | | |
| | | Lead | 4310 | .7 | Ref #12, p. 110 |
| | | Zinc | 826 | 2.7 | |
| | | Copper | 49.9 | 3.3 | |
| X109 | 12/15/93 | | | | |
| | | Lead | 2340 | .7 | Ref #12, p. 111 |
| | | Cadmium | 1320 | .7 | |
| | | Zinc | 71200 | 2.6 | |
| | | Copper | 3650 | 3.3 | |

SD-Hazardous Constituent Quantity
Source No.: 2

2.4.2. Hazardous Waste Quantity

Insufficient information exists to evaluate Hazardous Constituent Quantity, Hazardous Wastestream Quantity and Volume. Therefore, the Hazardous Waste Quantity value for Source #2 is based on the area of the documented contamination in the shallow wastepile.

2.4.2.1.1. Hazardous Constituent Quantity

Not scored

2.4.2.1.2. Hazardous Wastestream Quantity

Not scored

2.4.2.1.3 Volume

Not scored

2.4.2.1.4. Area

The area of the polygon defined by CERCLA Integrated Assessment samples (listed in clockwise direction) X102, X107, X108, X109, X103 and X104 was measured using a planimeter and a 1988 aerial photograph (Ref #9). The planimeter readings were converted from square inches to square feet. Source #2 has been determined to occupy a gross area of approximately 664,641 square feet (15.26 acres) (Ref #11).

Area (A) = 664,641 $Ft^2$

To obtain a Hazardous Waste Quantity value for a pile, Table 2-5 of the Hazard Ranking System Final Rule instructs that the area value of the land surface under the pile in square feet is to be divided by a factor of 13 (Ref #1, Sec. 2.4.2.1.1). Therefore, the Hazardous Waste Quantity value for Source #2 was obtained as follows:

HWQ = 664,641 $Ft^2$ / 13 = 51,126

Area of source ($ft^2$): 664,641

Reference(s): Ref #11

Area Assigned Value: 51,126

2.4.2.1.5. Source Hazardous Waste Quantity Value

As previously indicated, the Hazardous Waste Quantity value for Source #2 is based on the area of the documented shallow wastepile contamination.

Source Hazardous Waste Quantity Value: 51,126

**SITE SUMMARY OF SOURCE DESCRIPTIONS**

| Source No. | Source Hazardous Waste Quantity Value | Containment | | | |
|---|---|---|---|---|---|
| | | Ground Water | Surface Water | Gas | Air Particulate |
| 1. Waste Pile | 19,983 | No | Yes | No | No |
| 2. Shallow Wastepile | 51,126 | No | Yes | No | No |

The hazardous waste quantity factor value of 10,000 has been assigned from Table 2-6 of the Hazard Ranking System (Ref #1, Sec. 2.4.2.2).

## 4.0 SURFACE WATER MIGRATION PATHWAY

The overland/flood migration to surface water migration component has been scored for the Surface Water Migration Pathway. Both an observed release by direct observation and by chemical analysis is documented. The groundwater to surface water migration component has not been scored. The Little Vermilion River, which lies just east of the Matthiessen and Hegeler site, is utilized as a fishery, therefore, the Human Food Chain Threat has been scored for the Surface Water Migration Pathway.

### 4.1 OVERLAND/FLOOD MIGRATION COMPONENT

During the November, 1991 CERCLA Screening Site Inspection and December, 1993 CERCLA Integrated Assessment sampling events, an observed release to surface water was documented by chemical analysis when seven sediment samples collected from the Little Vermilion River were found to contain levels of cadmium, copper, chromium, lead, nickel and zinc which met the observed release criteria established in Table 2-3 of the Hazard Ranking System (Ref #1, Sec. 2.3).

#### 4.1.1.1 DEFINITION OF HAZARDOUS SUBSTANCE MIGRATION PATH FOR OVERLAND/FLOOD COMPONENT

The former Matthiessen and Hegeler Zinc Company property is located on the eastern edge of the town of LaSalle and lies just west and adjacent to the Little Vermilion River (see Figures 2-1 and 2-2). Surface water runoff from Sources 1 and 2 flows in a easterly direction into the Little Vermilion River (Ref #3, p. 5-4). Runoff from the wastepile (Source #1) flows directly into the Little Vermilion River as the pile is located immediately adjacent to the river and the lower portion of the wastepile is actually located along the western bank of the river (Ref #3, p. 5-4 and 5-5; Ref. #9; Ref. #3, Appendix E, p. 6; Ref. #4, Appendix E, p. 16). Runoff from the shallow wastepile (Source #2) flows into the Little Vermilion River through natural drainage pathways (Ref #17 and Ref #3, p. 5-4 and 5-5) and also through drainage which enters an old abandoned and collapsed storm sewer line which was formerly used by the city of LaSalle (Ref #3, p. 5-5). Figure 4-1 shows the two probable points of entry (PPEs) of runoff from the two site sources into the Little Vermilion River.

After site drainage flows into the Little Vermilion River, the Little Vermilion River flows south for approximately 1.2 miles before it enters the westerly flowing Illinois River (see Figure 4-1). The remaining 13.8 miles of the 15 mile surface water pathway target distance is in the Illinois River. The end of the surface water target distance is located approximately one mile south of the town of DePue, Illinois (see Figure 4-1 for the Fifteen Mile Surface Water Pathway Map).

**4.1.2.1 LIKELIHOOD OF RELEASE**
The likelihood of release factor category has been scored for the observed release factor. Therefore, the potential to release factor has not been scored.

**4.1.2.1.1 Observed Release**

Information has been scored to document an observed release to surface water by direct observation and by chemical analysis.

Direct Observation
A 1988 aerial photograph (see Figure 2-3) and photographs taken during the 1991 Screening Site Inspection at Carus Chemical (Ref #4, Appendix E, p. 16) and the 1993 Integrated Assessment at Matthiessen and Hegeler (Ref #3, Appendix E, p. 6) provide documentation that the waste pile (Source #1) has been in contact with the Little Vermilion River since at least 1988 when the aerial photograph was taken. The waste pile has actually been in contact with the Little Vermilion River for many more years than that as the waste pile resulted from the dumping of waste materials during the time when the smelter was in operation (Ref. #3, p. 4-3). It has been observed that a portion of this slag is now located in the Little Vermilion River (Ref #4, Appendix E, p. 16; Ref #3, Appendix E, p.6).

- Basis for Direct Observation

According to Section 4.1.2.1.1 of the Hazard Ranking System Final Rule (Ref #1), an observed release by direct observation has been documented for this site because material containing one or more hazardous substances has entered the surface water through direct deposition.

As mentioned above, when Matthiessen and Hegeler was in operation they dumped their waste slag into a pile that went down into the valley of the Little Vermilion River, with the bottom of the pile being located in the river itself. This is documented by the following photographs. A 1988 aerial photograph (see Figure 2-3) documents the waters of the Little Vermilion River in contact with the eastern edge of Source #1. Also, photographs taken during the 1991 Screening Site Inspection at Carus Chemical (Ref #4, Appendix E, p. 16) and the 1993 Integrated Assessment at Matthiessen and Hegeler (Ref #3, Appendix E, p. 6) indicated that a portion of Source #1 (wastepile) was observed being located alongside and within the waters of the Little Vermilion River.

As previously described, the wastepile contained smelter wastes from the Matthiessen and Hegeler Zinc Company. In 1993, samples X104, X105 and X106 were collected in the wastepile (Ref. #5, p. 3 - 4) and documented the presence of hazardous substances (Ref #12, p. 106 - 108). Since the wastepile was found to contain hazardous substances at this times when a portion of the wastepile was documented to be in contact with the Little Vermilion River, a release to the surface water pathway can be documented by direct observation.

- Hazardous Substances in the Release

Information regarding the hazardous substances detected in samples X104, X105 and X106, which were collected from Source #1, were initially presented in Section 2.4.1 of this record. The hazardous substances which were detected in these samples are presented again below.

| Sample Number | Date of Sample | Hazardous Substance | Conc. (mg/kg) | Sample Detection Limits(mg/kg) | References |
|---|---|---|---|---|---|
| X104 | 12/14/93 | Cadmium | 36.1 | .7 | Ref #12, P. 106 |
| | | Copper | 806 | 3.3 | |
| | | Chromium | 43.3 | 1.3 | |
| | | Lead | 905 | .7 | |
| | | Zinc | 10200 | 2.7 | |
| X105 | 12/14/93 | Cadmium | 59.8 | .6 | Ref #12, P. 107 |
| | | Copper | 428 | 3.1 | |
| | | Chromium | 31.9 | 1.2 | |
| | | Lead | 342 | .6 | |
| | | Nickel | 105 | 4.9 | |
| | | Zinc | 42000 | 2.5 | |
| X106 | 12/14/93 | Cadmium | 181 | .6 | Ref #12, P. 108 |
| | | Copper | 4340 | 3.1 | |
| | | Chromium | 38.1 | 1.2 | |
| | | Lead | 1370 | .6 | |
| | | Nickel | 118 | 5.0 | |
| | | Zinc | 37500 | 2.5 | |

Observed Release by Chemical Analysis

In addition to having an observed release of contaminants to the Little Vermilion River by direct observation, the release of contaminants has also been documented by chemical analysis. In December, 1993 the Illinois Environmental Protection Agency conducted a CERCLA Integrated Assessment sampling event at the former Matthiessen and Hegeler Zinc Company property in LaSalle (Ref. #3, p. 1-2). In November, 1991 the Illinois Environmental Protection Agency conducted a CERCLA Screening Site Inspection sampling event at the Carus Chemical Company (Ref. #4, p. 1-1), which was also formerly part of the Matthiessen and Hegeler Zinc Company property. During these inspections the sampling teams collected a series of ten sediment samples from the stream bed of the Little Vermilion River, which receives surface water runoff from the former Matthiessen and Hegeler Zinc Company property. During the 1991 sampling event, sediment samples X201, X202, X203, X204 and X208 were collected within the Little Vermilion River (Ref. #4, p. 3-7 and 3-8). Since some of these sample numbers were duplicated during the 1993 sampling event, the 1991 samples will be referred to as X201(1991), X202(1991), X203(1991), X204(1991) and X208(1991). During the 1993 sampling event, five sediment samples were collected within the Little Vermilion River (Ref. #3, Table 3-2 and Figure 3-1) and will be referred to as X201(1993), X202(1993), X203(1993), X204(1993) and X205(1993).

Sediment sample X201(1993) was collected upstream of the former Matthiessen and Hegeler Zinc Company property for the purpose of documenting background levels of potential contaminants (Ref. #5, p. 6). Sediment samples X205 (1993) and X208 (1991) were collected along the northern portion of the Matthiessen and Hegeler property but upstream of the sources of contaminantion present on the property and also will be considered background samples. Sediment samples X201(1991), X202(1991), X203(1991), X204(1991), X208(1991), X202(1993), X203(1993) and X204(1993) were collected alongside and downstream of the former smelter property to document the off-site migration of contaminants into the Little Vermilion River. Since sediment sample X204(1993) was collected in essentially the same location as X202(1991), of these only X202(1991) will be used for scoring purposes. The locations of these sediment samples can be seen on Figures 4-2 and 4-3.

Sediment samples X201(1991), X202(1991), X203(1991), X204(1991) and X204(1993) were found to contain elevated concentrations of the same inorganic contaminants as were found in the on-site wastepiles (Source #1 and Source #2). When compared with the background sediment samples X201 (1993), X205 (1993) and X208 (1991), these sediment samples were found to contain concentrations which meet the criteria for an observed release contained within Table 2-3 of the Hazard Ranking System (Ref. #1, Sec. 2.3) of at least one of the following contaminants: cadmium, copper, lead, nickel and zinc. When comparing the downstream sample concentrations to the background sample concentrations, to be conservative, the highest of the three background concentrations was used for the comparison value.

- Background Concentration

As previously mentioned, sediment samples X201(1993), X205 (1993) and X208 (1991) are used to establish background concentrations of contaminants within the sediment of the Little Vermilion River (Ref. #3, p. 3-19 and Ref. #6, p. 14). These samples were collected from areas which are located upstream of the majority of the area of influence of the smelting operations. The locations for samples X205 (1993) and X208 (1991) can be seen on Figure 4-2 and the location of sample X201(1993) can be seen on Figure 4-3. Based on the levels of metals found in sediment samples X205

(1993) and X208 (1991), it appears that the area they were collected from has been impacted by the smelter operations but not to the degree that the sediments downstream have been.

The background samples, like all of the sediment samples collected during the CERCLA Integrated Assessment sampling event, were collected from the stream bed within the top eight inches of sediment (Ref. #3, p. 3-19 and Ref. #4, p. 3-7). Sediment sample X205 (1993) is similar in composition to the contaminated samples located downstream of the sources of contamination. They are both referred to as brown clays (Ref #3, p. 3-19). The composition of sediment sample X201 (1993) was not as similar in composition as it was described as a brown, silty sand (Ref #3, p. 3-19). The composition of sediment sample X208 (1991) was described as a medium-sized brown sand (Ref #6, p. 14).

| Sample ID | Hazardous Substance | Concentration mg/kg | Sample Detection Limits(mg/kg) | Reference |
|---|---|---|---|---|
| X201(1993) | Cadmium | undetected | .8 | Ref. #12, |
| | Copper | 5.5B | 3.8 | P. 112 |
| | Lead | 6.9 | .8 | |
| | Nickel | 5.6B | 6.1 | |
| | Zinc | 48.2 | 3.0 | |
| X205(1993) | Cadmium | 2.6 | .7 | Ref #12, |
| | Copper | 16.4 | 3.5 | p. 116 |
| | Lead | 15.4 | .7 | |
| | Nickel | 25.3 | 5.5 | |
| | Zinc | 150 | 2.8 | |
| X208(1991) | Cadmium | 1.3 | .6 | Ref #13, |
| | Copper | 7.7 | 3.1 | p. 17 |
| | Lead | 7.6 | .6 | |
| | Nickel | 7.4 | 4.9 | |
| | Zinc | 60.2 | 2.4 | |

Note: The U qualifier means that the analyte was analyzed for but not detected. The B qualifier means that the reported value is less than the contract required detection limit but greater than the instrument detection limit.

- Contaminated Samples

Refer to Figure 4-2 for the locations of the sediment samples (X201(1991), X202(1991), X203(1991), X204(1991) and X204(1993)) which meet the criteria of an observed release by chemical analysis. The table below lists these sediment samples in order from the farthest upstream sample (X201 (1991)) to the farthest downstream (X204(1991)).

| Sample ID | Hazardous Substance | mg/kg Concentration | Sample Detection Limits(mg/kg) | Reference |
|---|---|---|---|---|
| X201(1991) | Cadmium | 36.8 | .7 | Ref #13, |
| | Copper | 102 | 3.6 | p. 10 |
| | Lead | 594 | .7 | |
| | Zinc | 6500 | 2.9 | |
| X202(1993) | Cadmium | 28.4 | .8 | Ref #12, |
| | Lead | 164 | .8 | p. 113 |
| | Zinc | 4670 | 3.1 | |
| X203(1993) | Cadmium | 46.5 | .8 | Ref #12, |
| | Lead | 325 | .8 | p. 114 |
| | Zinc | 12100 | 3.1 | |
| X202(1991) | Cadmium | 22.8 | 1.0 | Ref #13, |
| | Lead | 1050 | 1.0 | p. 11 |
| | Zinc | 4630 | 3.9 | |
| X203(1991) | Cadmium | 15.3 | .7 | Ref #13, |
| | Copper | 186 | 3.3 | p. 12 |
| | Lead | 733 | .7 | |
| | Nickel | 85.4 | 5.3 | |
| | Zinc | 6290 | 2.6 | |
| X204(1991) | Lead | 262 | .8 | Ref #13 |
| | Zinc | 1570 | 3.3 | P. 13 |

Note that the concentrations reported above meet the criteria to establish an observed release by chemical analysis as described in Section 2.3 and Table 2-3 of the Hazard Ranking System Final Rule (Ref #1, Sec. 2.3), i.e., the sample concentration must equal or exceed the sample quantitation limit (SQL) if the background was not detected, or the sample concentration must be at least three (3) times greater than the background concentration which was detected.

Attribution:

The hazardous substances detected in the contaminated sediment (X201(1991), X202(1991), X203(1991), X204(1991) and X204(1993)) of the Little Vermilion River are attributed to the Matthiessen and Hegeler Zinc Company site. The same hazardous substances as were found in the sediments have been documented in the wastepile (Source #1) and in the contaminated soils (Source #2) at the site with surface water overland/flood migration values greater than zero.

There are no other known sources of metals located upstream of or alongside the Matthiessen and Hegeler property that would have contributed to the metals contamination of the sediments of the Little Vermilion River. There is a cement mining operation located across the Little Vermilion River from the former Matthiessen and Hegeler property. According to this company's National Pollution Discharge Elimination System (NPDES) permit filed with the Illinois EPA, however, this mining process does not contribute the metals associated with the Matthiessen and Hegeler site into the Little Vermilion River (Ref #18, p. 3)

A zinc rolling mill (recently closed down) and an active manufacturer of specialty chemicals (Ref #8, p. 2) are located on portions of the former Matthiessen and Hegeler property. The zinc rolling mill has no discharges into the Little Vermilion River so is not thought to have contributed to the contamination of the river's sediments. The chemical manufacturer has a NPDES discharge into the Little Vermilion River but does not contribute the metals associated with the Matthiessen and Hegeler site into the Little Vermilion River.

Hazardous Substances Released:
As indicated in the preceding table, the following substances meet the criteria for an observed release by chemical analysis: cadmium, copper, lead, nickel and zinc. In addition, an observed release by direct contact was established for the following substances: cadmium, copper, lead, nickel and zinc.

==========

Observed Release Factor Value: 550

4.1.2.1.2 **POTENTIAL TO RELEASE**

Because the analysis of sediment samples collected in the Little Vermilion River during CERCLA sampling events documented an observed release to surface water, the Surface Water Potential to Release was not scored.

**4.1.2.2 DRINKING WATER THREAT - WASTE CHARACTERISTICS**

The drinking water threat of the Surface Water Pathway has not been scored due to no known usage of surface water as drinking water within the Target Distance Limit for this site.

**4.1.3 HUMAN FOOD CHAIN THREAT**

The Little Vermilion River is utilized as a fishery, therefore, the Human Food Chain Threat has been scored for the Surface Water Migration Pathway. The fact that the Little Vermilion River is used as a fishery is documented in the Illinois Department of Natural Resources booklet entitled "Illinois Fishing Guide" (Ref. #14, p. 36). In addition, Illinois EPA personnel have documented the presence of fishing gear being located along the bank of the Little Vermilion River downstream of the former Matthiessen and Hegeler property (Ref. #15), indicating that the river is used as a fishery.

**4.1.3.1 HUMAN FOOD CHAIN THREAT - LIKELIHOOD OF RELEASE**

The likelihood of release factor category was previously scored in Section 4.1.2.1 (and the associated subsections) of this documentation record. Therefore, a Human Food Chain Threat-Likelihood of Release factor value of 550 has been assigned.

**4.2.3.2 HUMAN FOOD CHAIN THREAT - WASTE CHARACTERISTICS**

As instructed in Section 4.1.3.2 of the Hazard Ranking System Final Rule (Ref #1, p. 51617), the waste characteristics factor category has been scored based on the toxicity/persistence/bioaccumulation and hazardous waste quantity factors.

**4.1.3.2.1 Toxicity/Persistence/Bioaccumulation**

As instructed in Sections 4.1.3.2.1 and 4.1.2.2 of the Hazard Ranking System Final Rule (Ref #1), those hazardous substances that are available to migrate from the sources at the site to surface water via the overland/flood hazardous substance migration path have been scored in determining the waste characteristics factor category value. This includes a) those substances that meet the criteria for an observed release to surface water (by chemical analysis) in the watershed and b) all hazardous substances associated with sources that have surface water containment factor values greater than zero (0) for the watershed.

The table on the following page summarizes those hazardous substances which meet the criteria outlined in the above paragraph and have been scored in determining the waste characteristics factor category value.

| Hazardous Substance | Source No. | Toxicity Factor Value | Persistence Factor Value | Bioaccu-mulation Value | Toxicity/ Persistence/ Bioaccumulation Factor Value (Table 4-16) | Ref. |
|---|---|---|---|---|---|---|
| Cadmium | 1, 2 | 10,000 | 1.0000 | 5,000 | 50,000,000 | 1, 2 |
| Copper | 1, 2 | - | 1.0000 | 50,000 | - | 1, 2 |
| Lead | 1, 2 | 10,000 | 1.0000 | 50.0 | 500,000 | 1, 2 |
| Nickel | 1, 2 | 10,000 | 1.0000 | .5 | 5,000 | 1, 2 |
| Zinc | 1, 2 | 10 | 1.0000 | 500 | 5,000 | 1, 2 |

As instructed in Section 4.1.3.2.1.4 of the Hazard Ranking System Final Rule (Ref #1), the hazardous substance with the highest Toxicity/Persistence/Bioaccumulation Factor Value has been used to evaluate the Waste Characteristics Factor Category Value. Therefore, cadmium with a toxicity/persistence/bioaccumulation factor value of 5 x $10^7$ has been chosen.

Toxicity/Persistence/Bioaccumulation Factor Value: 5 x $10^7$

#### 4.1.3.2.2 Hazardous Waste Quantity

| Source Number | Source Hazardous Waste Quantity Value (Section 2.4.2.1.5.) | Is source hazardous constituent quantity data complete? (yes/no) |
|---|---|---|
| 1 | 19,983 | No |
| 2 | 19.5 | No |

Sum of values: 20,002 = Assigned Value 10,000

#### 4.1.3.2.3 Waste Characteristics Factor Category Value

Toxicity/persistence factor value X hazardous waste quantity factor value:
1.0E + 04 X 1.0E +04 = 1.0E + 08

(Toxicity/persistence x hazardous waste quantity) X bioaccumulation potential factor value: 1.0E + 08 X 5.0E +03

Utilizing the waste characteristics factor category value Table 2-7 of the Hazard Ranking System, the toxicity/persistence/waste quantity/bioaccumulation potential factor value of 5 X $10^{11}$ was assigned a waste characteristics factor value of 560 (Ref #1, Sec. 2.4.3.2).

==========

Hazardous Waste Quantity Assigned Value: 10,000
Waste Characteristics Factor Category Value: 560

### 4.1.3.3 HUMAN FOOD CHAIN THREAT-TARGETS

Actual Human Food Chain Contamination

Four inorganic contaminants found in the sediments of the Little Vermilion River have a food chain bioaccumulation factor value of 500 or greater (cadmium, copper, nickel and zinc). The fishery itself to date has not been tested for chemical contamination.

According to the Illinois Department of Natural Resources' booklet entitled ''Illinois Fishing Guide'', the following types of sport fish are located in the Little Vermilion River: smallmouth bass, bluegill, sunfish, crappie, channel catfish, bullheads, carp and drum (Ref #14, p. 36). Illinois EPA personnel have documented the presence of fishing gear being located along the bank of the Little Vermilion River downstream of the former Matthiessen and Hegeler property (Ref. #15), indicating that the river is used as a fishery.

Level I Concentrations

No level I concentrations have been identified for the Human Food Chain Threat.

Level II Fisheries

| Identify of Fishery | Extent of Level II Fishery (relative to PPE #1) | Refs. |
|---|---|---|
| Little Vermilion River | 0.45 miles | Figure 4-2 |

4.1.3.3.1 **Food Chain Individual**

Because an observed release of a hazardous substance with a bioaccumulation factor value of 500 or greater was documented through the chemical analysis from a sediment sample within the Little Vermilion River, a Food Chain Individual Factor value of 45 has been assigned (Ref #1, Sec. 4.1.3.3).

Sample ID: X201 (1991)

| Hazardous Substance | Cadmium | Copper | Zinc | Nickel |
|---|---|---|---|---|
| Bioaccumulation Potential | 5,000 | 50,000 | 500 | 5,000 |

==========

Food Chain Individual Factor Value: 45

4.1.3.3.2 Population

4.1.3.3.2.2 Level II Concentrations

| Identity of Fishery | Annual Production (pounds) | Refs. | Human Food Chain Population Value (Table 4-18) |
|---|---|---|---|
| Little Vermilion River | >0 | 14, p. 36 | 0.03 |

While the exact pounds of fish caught for human consumption is not known, since it is known that people fish the Little Vermillion River in general along the reach of the river adjacent to the Matthiessen and Hegeler property, it is assumed that at least one fish with a weight greater than zero is caught yearly.

Level II Concentrations Factor Value: 0.03

4.1.3.3.2.1 Potential Food Chain Contamination

The Potential Human Food Chain Contamination portion of the Surface Water pathway has not been scored.

==========

Potential Human Food Chain Contamination: 0

SWOF/Environment - Targets

### 4.1.4 **Surface Water Pathway Environmental Threat**

The Surface Water Environmental Threat Pathway was not scored. There are approximately 0.4 miles of wetland frontage located along the Little Vermilion River in the vicinity of the Matthiessen and Hegeler site (see Figure 4-1). However, these are located upstream of the surface water Probable Point of Entry.

In addition, the Illinois Department of Natural Resources has identified two sensitive environments along the Illinois River. These, however, are located farther than fifteen miles downstream of the site.

## 4.2 GROUND WATER TO SURFACE WATER MIGRATION COMPONENT

Not scored.

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| **DOC ID #** | 147326 |
| **DESCRIPTION OF ITEM(S)** | Maps |
| **PRP** | RMD - Matthiessen and Hegeler Zinc Co. |
| **DOCUMENT VARIATION** | _X_ COLOR **OR** ___ RESOLUTION |
| **DATE OF ITEM(S)** | 4/16/88 |
| **NO. OF ITEMS** | # 5 |
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| **COMMENT(S)**<br>Figure 2-2 to 2-4, Figure 4-2 | |

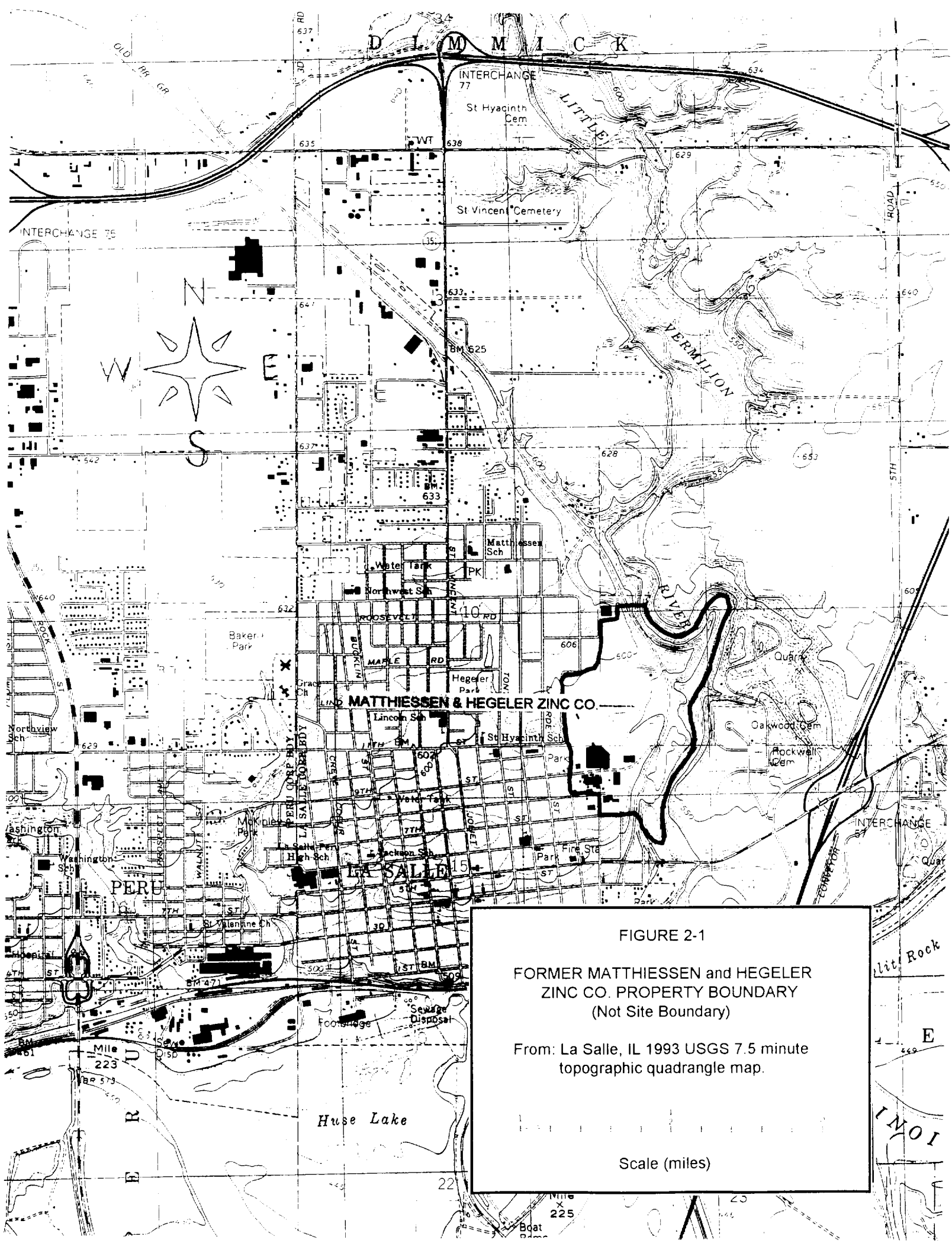


FIGURE 2-1

FORMER MATTHIESSEN and HEGELER ZINC CO. PROPERTY BOUNDARY
(Not Site Boundary)

From: La Salle, IL 1993 USGS 7.5 minute topographic quadrangle map.

Scale (miles)


**Former Matthiessen Hegeler Property Map**

**Figure 2-2**


**Source # 1 Map / Waste Pile**

**Figure 2-3**


**Source # 2 Map / Shallow Waste Pile**

**Figure 2-4**


**Sediment Sample Location Map**

**Figure 4-2**

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| DOC ID # | 147326 | | |
| DESCRIPTION OF ITEM(S) | Map | | |
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| DATE OF ITEM(S) | 1983 | | |
| NO. OF ITEMS | 1 | | |
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| 15-Mile Surface Water Map | | | |

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| **COMMENT(S)**<br>Figure 4-3 | |

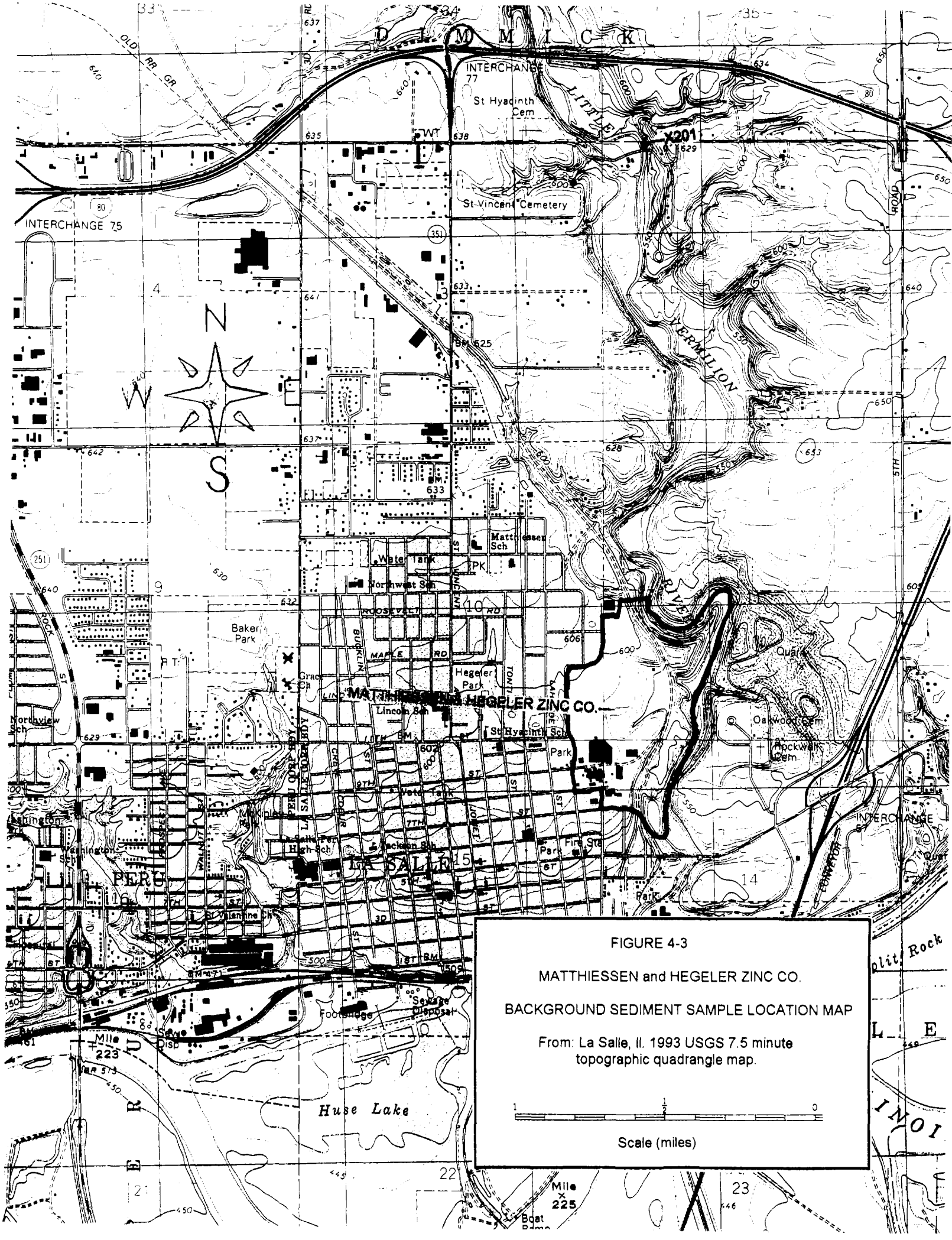


FIGURE 4-3

MATTHIESSEN and HEGELER ZINC CO.

BACKGROUND SEDIMENT SAMPLE LOCATION MAP

From: La Salle, Il. 1993 USGS 7.5 minute topographic quadrangle map.